

**REMARKS**

Applicant thanks the Examiner for the attention accorded the present Application in the June 10, 2003 Office Action, in which claims 1-7 and 18-41 were pending. In that Action, claims 1-7, 18-26 and 28-41 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kanno in view of Inagaki; and claim 27 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Kanno in view of Inagaki, and further in view of Cheadle.

Claims 1-7 and 18-41 are now currently pending in this Application. Based on the above amendments and following remarks, Applicant respectfully submits that the rejections to claims 1-7 and 18-41 have been overcome. Reconsideration of this Application is therefore respectfully requested.

**35 U.S.C. § 103(a) rejections**

Claims 1-7, 18-26 and 28-41 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kanno in view of Inagaki et al. Claim 27 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Kanno in view of Inagaki et al., and further in view of Cheadle. Applicant respectfully disagrees with the Examiner's conclusion and submits that the present invention is not obvious in view of, nor is it even suggested by, Kanno, Inagaki and/or Cheadle.

As presently claimed in Applicant's independent claims, Applicant's invention comprises "[a] creep resistant zirconium-based alloy for use in nuclear fuel cladding, wherein the zirconium-based alloy comprises a coarse grained lath alpha microstructure, wherein the zirconium-based alloy comprises a middle annular layer in the cladding disposed between an inner annular layer in the cladding and an outer annular layer in the cladding, and wherein the zirconium-based alloy comprises approximately 1.2-1.7 weight percent Sn, approximately 0.13 to less than 0.20 weight percent Fe, approximately 0.06-

0.15 weight percent Cr, approximately 0.05-0.08 weight percent Ni, and the balance being substantially zirconium.”<sup>1</sup>

In contrast, Kanno does not disclose a nuclear fuel cladding having three annular layers, wherein the middle annular layer comprises a zirconium-based alloy comprising a coarse grained lath alpha microstructure and approximately 1.2-1.7 weight percent Sn, approximately 0.13 to less than 0.20 weight percent Fe, approximately 0.06-0.15 weight percent Cr, approximately 0.05-0.08 weight percent Ni, and the balance being substantially zirconium. In fact, the Examiner has even previously noted that “Kanno et al do not teach that the intermediate layer is a zirconium-based alloy with a coarse grained lath alpha microstructure.”<sup>2</sup> Therefore, Kanno does not disclose, nor even suggest, the zirconium-based alloy comprising a coarse grained lath alpha microstructure, as recited in independent claims 1, 21 and 30 of Applicant’s invention.

Inagaki fails to cure the deficiencies of Kanno. Inagaki does not disclose a nuclear fuel cladding having three annular layers, wherein the middle annular layer comprises a zirconium-based alloy comprising a coarse grained lath alpha microstructure and approximately 1.2-1.7 weight percent Sn, approximately 0.13 to less than 0.20 weight percent Fe, approximately 0.06-0.15 weight percent Cr, approximately 0.05-0.08 weight percent Ni, and the balance being substantially zirconium either. Inagaki’s invention comprises “a nuclear fuel cladding tube made of a zirconium-based alloy ... consisting essentially of 1 to 2 wt % Sn, 0.20 to 0.35 wt % Fe, 0.03 to 0.16 wt % Ni, not more than 0.15 wt % Cr, and the balance substantially Zr.”<sup>3</sup> Shown below is a comparison of the different compositions of Applicant’s and Inagaki’s inventions.

	<u><b>Applicant’s alloy</b></u>	<u><b>Inagaki’s alloy</b></u>
Sn	1.2 to 1.7 wt %	1 to 2 wt %
<i><b>Fe</b></i>	<i><b>0.13 to less than 0.20 wt %</b></i>	<i><b>0.20 to 0.35 wt %</b></i>
Cr	0.06 to 0.15 wt %	0.05 to 0.15 wt %
Ni	0.05 to 0.08 wt %	0.03 to 0.16 wt %
Zr	balance	balance

<sup>1</sup> Applicant’s spec., independent claim 1. *See also* Applicant’s spec., independent claims 21 and 30, which claim the same zirconium-based alloy composition as claim 1.

<sup>2</sup> Office Action dated 03/18/2003, pg. 3.

<sup>3</sup> Inagaki, independent claims 1. *See also* Inagaki’s independent claims 3, 5 and 7, which claim similar compositions.

Therefore, clearly Inagaki does not disclose, nor even suggest, the zirconium-based alloy comprising a coarse grained lath alpha microstructure, as recited in independent claims 1, 21 and 30 of Applicant's invention.

Cheadle fails to cure the deficiencies of Kanno and Inagaki. Cheadle does not disclose a nuclear fuel cladding having three annular layers, wherein the middle annular layer comprises a zirconium-based alloy comprising a coarse grained lath alpha microstructure and approximately 1.2-1.7 weight percent Sn, approximately 0.13 to less than 0.20 weight percent Fe, approximately 0.06-0.15 weight percent Cr, approximately 0.05-0.08 weight percent Ni, and the balance being substantially zirconium either. In fact, the only alloy disclosed in Cheadle has the composition of 2.5-4.0% Sn, 0.05-1.5% Mo, 0.5-0.15% Nb, 800-1300 ppm O, with the balance being Zr + incidental impurities.<sup>4</sup> Thus, Cheadle does not disclose, nor even suggest, the zirconium-based alloy comprising a coarse grained lath alpha microstructure, as recited in independent claims 1, 21 and 30 of Applicant's invention.

Based on the above arguments and amendments, Applicant respectfully submits that independent claims 1, 21, 30 of the present invention are patentably distinguished from Kanno, Inagaki and Cheadle. As claims 2-7, 18-20 and 36-37 depend from claim 1, claims 22-29 and 38-39 depend from claim 21, and claims 31-35 and 40-41 depend from claim 30, the discussion above applies to these claims as well. Further, these claims each include separate novel features. Thus, Applicant respectfully requests allowance of pending claims 1-7, 18-26 and 28-41.

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<sup>4</sup> Cheadle, col. 3, lines 26-33.

**CONCLUSION**

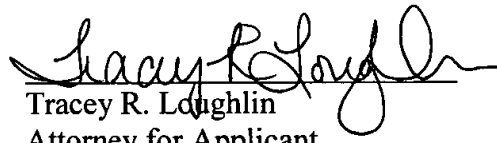
Applicant respectfully submits that the arguments presented above successfully traverse the rejections given by the Examiner in the Office Action. For the above reasons, it is respectfully submitted that the claims now pending patentably distinguish the present invention from the cited references. Allowance of pending claims 1-7 and 18-41 is therefore respectfully requested.

As this reply is being timely filed within one (1) month of the mailing date of the Office Action, Applicant believes that there is no fee due for this response. If this is incorrect however, the Commissioner is authorized to charge any additional fees that may be due, or credit any overpayment, to **Deposit Account No. 04-1448**.

Should the Examiner have any questions, or determine that any further action is necessary to place this Application into better form for allowance, the Examiner is encouraged to telephone the undersigned representative at the number listed below.

Respectfully submitted,

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